

# Intervals & Curve Meshing

## CUBIT Users Workshop

# Outline

## Intervals & Curve meshing



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## Introduction

**Setting number of *intervals* (mesh edges)**

**Hard vs. Soft intervals**

**Equal vs. Biased meshing**

**Matching intervals for surface meshing**

**Homework (for lab session)**

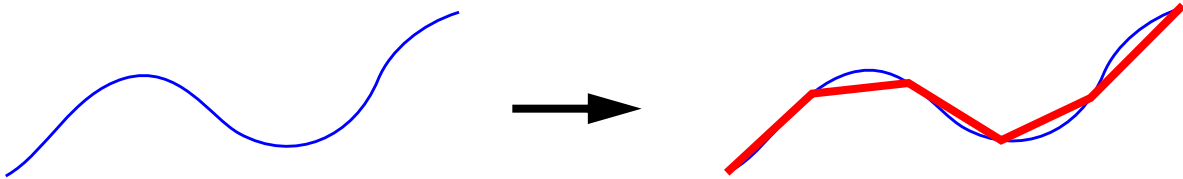
**...**

**lunch**

**Advanced commands & meshing schemes**

# Introduction

## Curve meshing: *intervals* = #mesh edges



## Advancing front paradigm:

- mesh first vertices, then curves, next surfaces, volumes
- CUBIT follows this automatically

## Vertices: one node for each vertex

## Curves: number of edges (>0) depends on

- User defined **intervals**
- **Or** User defined **size**

$$\# \text{ intervals} := \text{round}(\text{curve\_length} / \text{size})$$

- **And** meshing **algorithms** (curve, surface, volume)

unequal intervals, small adjustments

## Surfaces & Volumes:

size & number of elements induced by curves

# Setting intervals



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- `entity <id_range> Interval <interval>`

`#intervals = interval`

- `entity <id_range> Size <size>`

`#intervals = curve_length / size`

- `entity <id_range> Size Smallest Curve`

`size = length of smallest contained curve in entity`

## Entity is one of

- {Curve | Surface | Volume | Body | Group }
- Commands propagate **down** entity tree.

## Each edge same size (default)

# Hard vs. Soft intervals



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## Intervals have a **firmness**

**Hard:** exact intervals, CUBIT won't change

**Soft:** approximate intervals, small changes

**Default:** indeterminate value, possibly wild

## Explicitly set firmness

```
entity <range> Interval {Hard|Soft|Default}
```

## Interval & Size commands

- implicitly soft-sets
  - `Curve <id_range> Interval <x>` hard-sets
- Last command issued takes precedence
  - size command won't undo a hard-set,
  - explicitly unset first.

```
list curve 1
```

Demos: [\*\*intervals-setting.jou\*\*](#)

# Curve Meshing Schemes Equal & Bias



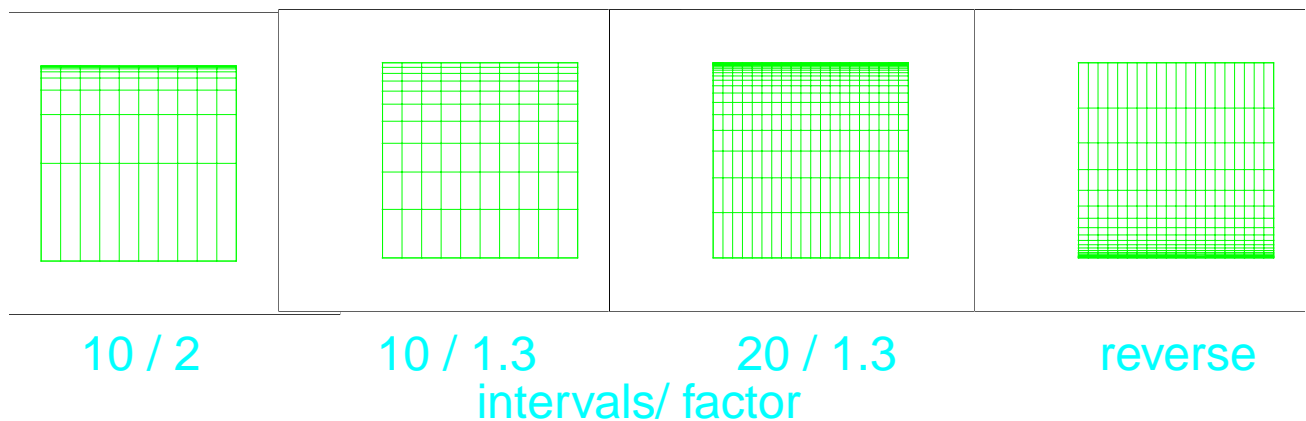
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Curve <curve\_id\_range> Scheme **Equal**

- Default scheme. Each edge equal length.

Curve <curve\_id\_range> Scheme **Bias** <factor>

- Edge length smaller at one end.
- Get elements where you want them.



- Geometric growth (**factor**).
- #intervals set as before, take care for proper end size.
- From start to end vertex.

Curve <curve\_id\_range> ReverseBias

- From end to start vertex (factor = 1/factor)
- post-meshing

# Listing and demos



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*Whisker Weaving and the STC*

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## Find out firmness, size, number intervals:

```
.....Scheme/  
_Name__ Id Meshed Length Number Size Factor Start End  
Curve 1. 1 bias/N . 10 .. 10 S .. 1 ... 2 .. 1/N. 2/N  
Curve 2. 2.equal/N. 10 ... 5 H ...2 ..... 3/N. 4/N  
Curve 3. 3.equal/N. 10 ... 1 .... 1 ..... 5/N. 6/N
```

**Demos:** [intervals-bias.jou](#)

# Matching intervals for surface meshing



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entity <id\_range> Match Intervals

Match Intervals entity <id\_range>

## Adjusts soft and default curves' intervals

- so that surfaces may be meshed according to schemes and hard intervals.
- Global problem
  - curve in two surfaces.
  - may be infeasible.
- Usually done automatically when meshing.
  - mesh surface 1 to 6 (meshes one by one)
  - match intervals surface 1 to 6 (matches all)
  - Good idea to do explicitly if meshing just some of the surfaces of a volume. Groups are handy.
- Still needs work for volume scheme constraints

Demos: [intervals-match.jou](#)

**! Delete the mesh if failure before retrying**



# Delete mesh



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## Delete Mesh

- deletes everything

## Delete Mesh entity <id\_range>

- deletes mesh on entity, and on geometry that **contains** entity.

## Delete Mesh entity <id\_range> propagate

- as above, plus
- deletes mesh on geometry **contained by** entity, unless another meshed entity contains that geometry.

**Example file makes distinction clear:**  
**del\_mesh.jou**

# Homework



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**Problems file: [intervals-homework](#)**

**Example exercises (not journal file)**